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Short Communication

On the occurrence of the genus *Gloeotaenium* (Oocystaceae, Trebouxiophyceae) in Brazil

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Abstract

We present here the first confirmed record of the genus *Gloeotaenium* in Brazil. The representative species (*Gloeotaenium loitlesbergianum*) was collected in a stream from Curaçá, northern Bahia state, Brazil. We provide a description of the species, illustrations, and taxonomic notes.

Key words: algae, Caatinga, Chlorophyta, semiarid, taxonomy.

Resumo

Nós apresentamos o primeiro registro confirmado do gênero *Gloeotaenium* (Oocystaceae, Trebouxiophyceae) no Brasil. A espécie representante (*Gloeotaenium loitlesbergianum*) foi coletada em um riacho de Curaçá, norte da Bahia, Brasil. Nesse trabalho nós fornecemos a descrição da espécie bem como ilustrações e notas taxonômicas.

Palavras-chave: algas, Caatinga, Chlorophyta, semiárido, taxonomia.

The freshwater algal genus *Gloeotaenium* Hansgirg (Oocystaceae, Trebouxiophyceae) is characterized by having cells rarely solitary, usually in 2–4(–8) cells colonies, within a stratified sheath containing calcite crystals; the cells are arranged in the form of a cross and separated from each other by a thick, dark-brown or black, calcite band (Komárek & Fott 1983; Tsarenko & John 2011).

The genus comprises two species: *G. minus* Pascher and *G. loitlesbergianum* Hansgirg. The former is a very rare species, and known only from its type locality (Austria), while the latter has a more cosmopolitan distribution (Komárek & Fott 1983; Guiry & Guiry 2019). The genus has rarely been reported in South America, with records to Venezuela (Yacubson 1980) and Argentina (Lacoste *et al.* 1987).

The only mention of the occurrence of *G. loitlesbergianum* in Brazil was performed by Bicudo & Menezes (2017) based on material collected at the São Paulo Botanic Garden. That record was not published with any taxonomic information about the species (such as description or figures), therefore making it impossible to confirm that identification. Consequently, the occurrence of *G. loitlesbergianum* in Brazil has been based only on that short citation. Thus, we present here the first confirmed record of the genus *Gloeotaenium* in Brazil, based on a taxonomic study of the species *G. loitlesbergianum.*

The present record is a partial result of the project "Flora Criptogâmica e Fanerogâmica do Semi-Árido - PPBIO", designed to study the biodiversity of plants, algae, and fungi in the semiarid region of northeastern Brazil.

The material studied was gathered with the aid of plankton net (20 µm) in December 2012, in the small Canabravinha stream (09º16'02.6"S, 39º33'19.6"W), located at the municipality of Curaçá, northern Bahia state, Brazil (Fig. 1). The area is characterized by having generally high temperatures (24 °C, annual average), low rainfall (400 mm, annual average) and vegetation typical of the Caatinga dryland domain.

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The stream had a large population of *Chara diaphana* (F.J.F.Meyen) R.D.Wood (Characaeae) and floating masses of filamentous green algae (Fig. 2). The collected material was examined under an Olympus BX45 Optical Microscope and photographed using a MicroPublisher - QImaging MP5.0-RTV-CLR-10-C digital camera. After analyses, the samples were preserved in Transeau's solution, following Bicudo & Menezes (2017), and subsequently incorporated into the liquid collection of the State University of Feira de Santana herbarium (HUEFS).

Taxonomic treatment

Chlorophyta.
Trebouxiophyceae.
Chlorellales.
Oocystaceae.
Gloeotaenium Hansgirg, 1890.
Gloeotaenium loitlesbergianum Hansgirg 1890: 10. Fig. 3

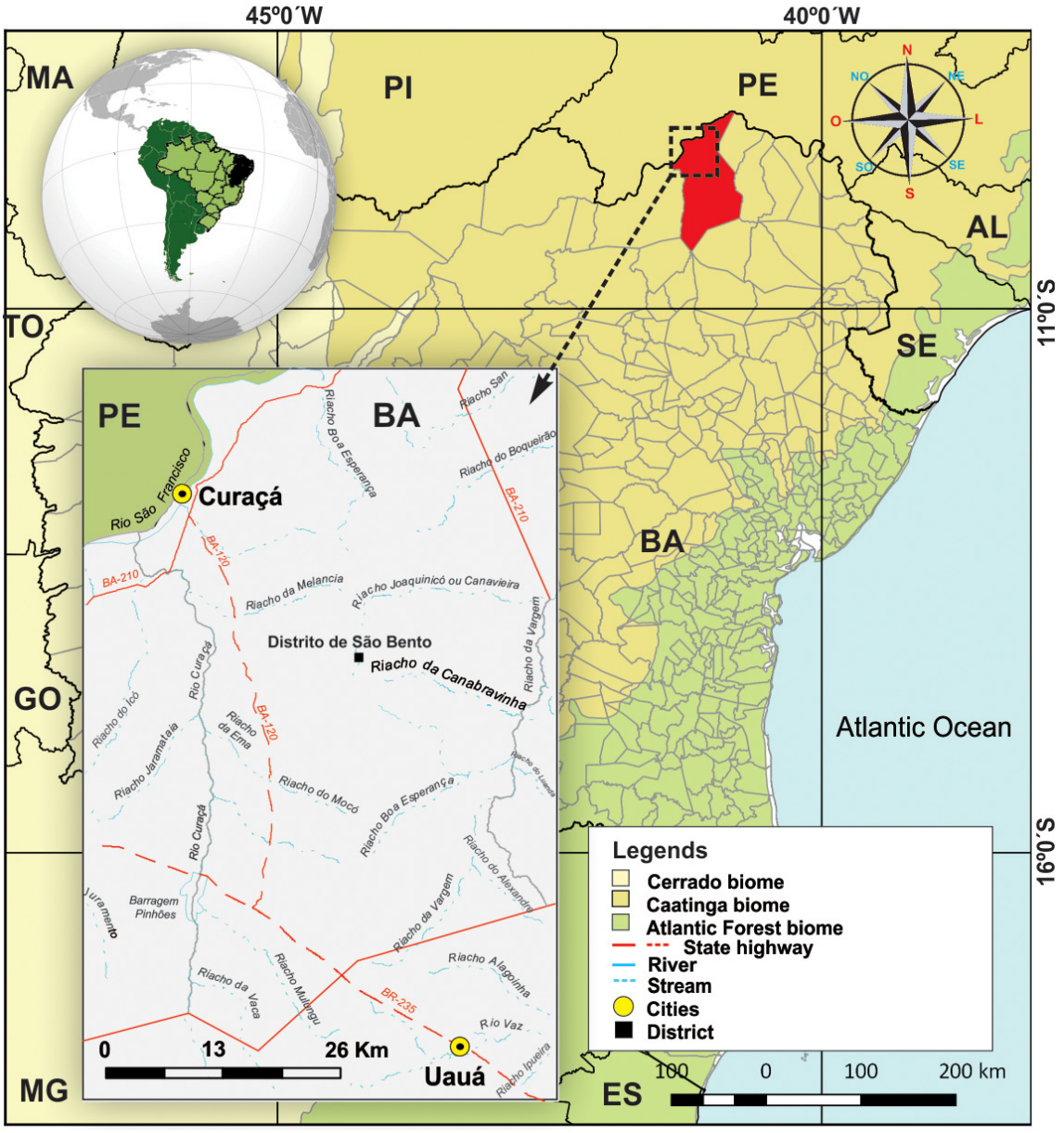

Figure 1 – Study Area Map showing the Curaçá region, Bahia, Brazil.

Colonies oval to elliptical, composed of 2–4 cells within the expanded mother cell wall. Cells broadly asymmetrically ovoid to ellipsoidal, separated from one another by a hyaline or gray/black stratified layer representing mainly the mother cell wall in the form of a transverse band (in 2-celled colonies) or a diagonal cross (in 4-celled colonies) composed of calcium carbonate (calcite crystals). Additional black, layered, cell wall accretions may be present as external caps at the ends and sides of the colony. Cell walls with W-shaped (in the side view) apical projections. Chloroplast massive, parietal with a single pyrenoid. Reproduction by autospores, released by the dissolution of the mother cell wall. Dimensions: cells 16–35 × 14–22 µm, colonies 50–77 µm diameter.

Material examined: Curaçá, Riacho da Canabravinha, 20.X.2012, *C.W.N. Moura, G.J.P. Ramos & I.B. Oliveira* (HUEFS 251805).

The species is distributed in Venezuela (Yacubson 1980), Argentina (Lacoste *et al.* 1987), Brazil (Bicudo & Menezes 2017 and the present study).

This green alga is usually found in ponds, swamps, and lakes with high calcium carbonate concentrations. Its occurrence in a stream of a semiarid region is interesting as it is rarely reported in lotic ecosystems. We do not have limnological data, but it was noteworthy the large populations of *Chara diaphana* inhabiting the Canabravinha stream.

The genus *Gloeotaenium* comprises two species: *G. loitlesbergianum* and *G. minus*. Those species are very similar, but the former differs by having larger oval to ellipsoidal cells (more than 12 µm in diameter) and a cosmopolitan distribution; the latter has smaller spherical cells (5–8 µm in diameter) and is endemic to Austria (Komárek & Fott 1983).

Overall, *Gloeotaenium loitlesbergianum* is considered a cosmopolitan species, although is more frequent in tropical than temperate zones (Komárek & Fott 1983; Hindak & Hindakova

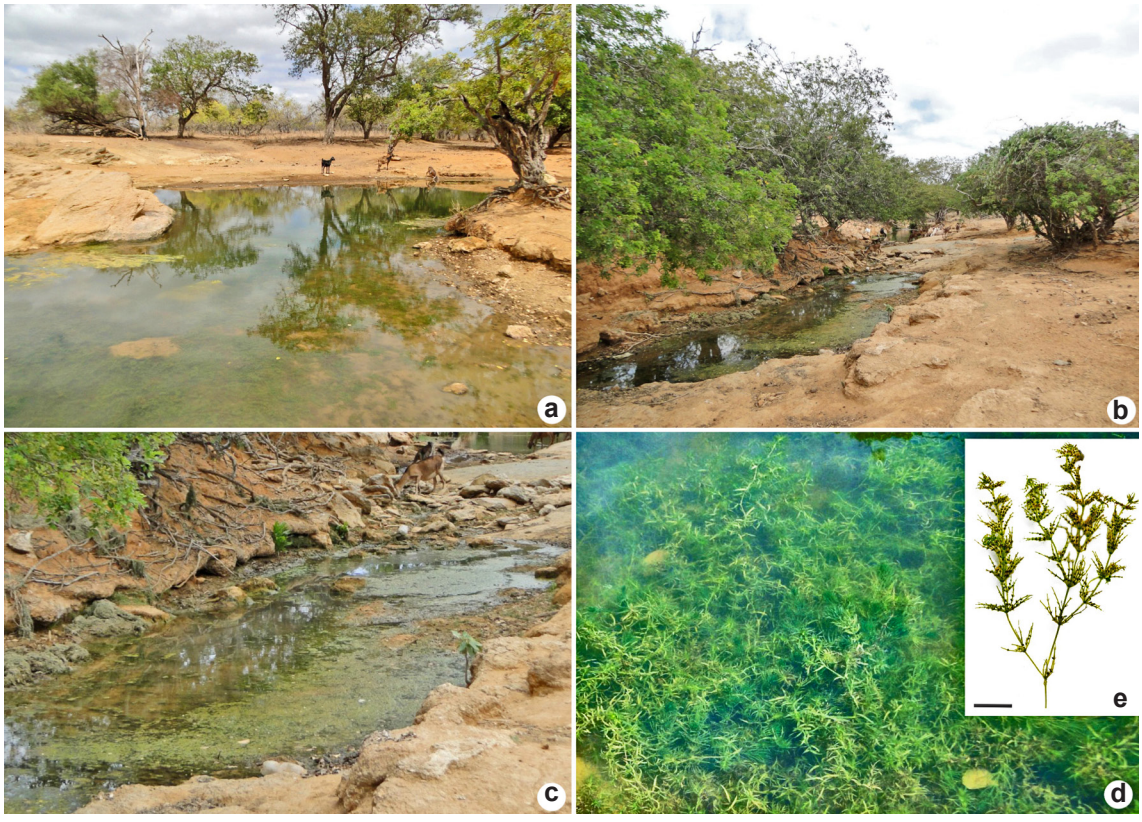

Figure 2 – a-c. General view of the Canabravinha stream, Curaçá, Bahia, Brazil. d. population of *Chara diaphana*; e. detail of branch of *C. diaphana*. Scale bar = 3 cm.

2008). This species is relatively easy to identify due to the black, stratified bands of deposited minerals between the cells. In general, the central band is darker than the accretions located at the ends and sides of the colony. When its mucilage is totally hyaline, however, (Fig. 3b) the taxon could be confused with other colonial genera such as *Oocystis* or *Nephrocytium*. The analysis of relatively large samples of any population will be important because most specimens have dark-colored mucilage. Additionally, *Gloeotaenium* species have cell walls with W-shaped apical projections (in side view) (Fig. 3g-i) that are absent in the other two genera.

In their study of mineral banding in cell walls using microchemical tests and spectroscopic analysis of *Gloeotaenium loitlesbergianum*, Prasad & Chowdary (1982) found that calcium carbonate was the principal band component. Strontium, magnesium, and barium (probably also in the form of carbonates) were also present. According to those authors, the latter three chemical elements have not been reported in association with calcium carbonate deposits in other algae.

Much like *Gloeotaenium*, other genera of green algae have been recently reported for the first time in Brazil during floristic studies in the Caatinga domain, such as *Westellopsis* (Ramos *et al.* 2014) and *Rhopalosolen* (Ramos *et al.* 2017), demonstrating how little is known about the algal biota of the semiarid region of

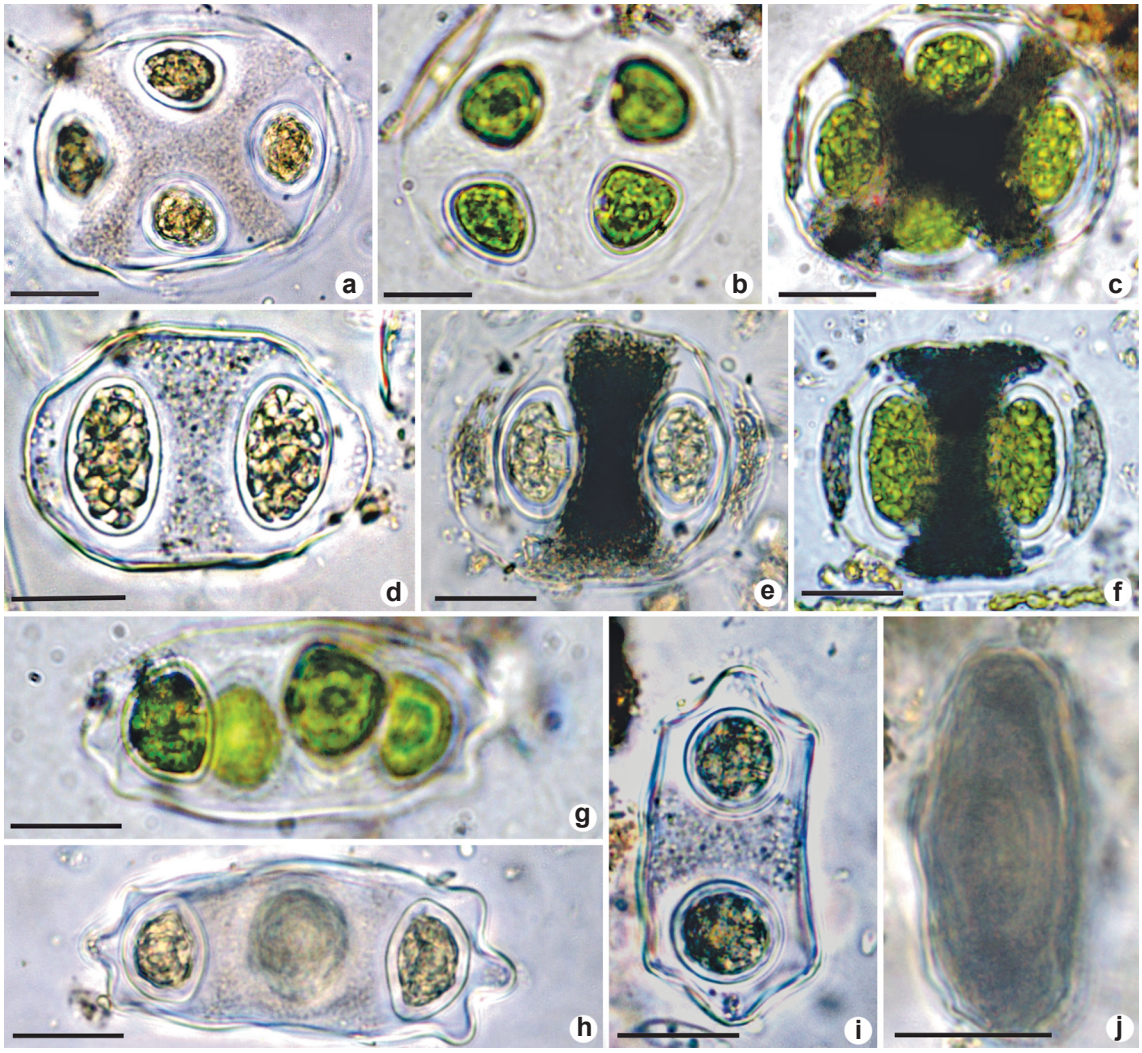

Figure 3 – a-j. *Gloeotaenium loitlesbergianum* – a-f. front view; g-i. lateral view; j. apical view. Scale bar = 20 µm.

northeastern Brazil, and indicating that more studies will be needed to broaden our knowledge on its biodiversity.

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